REMARKS/ARGUMENTS

A. General

On page 2 of the Office Action, the Examiner indicated that the Information Disclosure Statement filed August 8, 2001, fails to comply with 37 C.F.R. 1.98(a)(2) and, as such, information referred to therein has not been considered. Based on the Examiner's markings on the annotated copy the Information Disclosure Statement of August 8, 2001, which was received along with the Office Action mailed August 26, 2004, and in further view of the telephone conference held between Examiner Do and the Applicant's representative on November 16, 2004, it is the Applicant's understanding that copies of the following three (3) non-patent literature documents were missing from the Examiner's records:

- Adaptive filters; Theory and Applications/B. Farhang-Boroujeny. John Wiley & Sons Ltd. (chapter 12, pages 413-437);
- Numerical recipes in C: the art of scientific computing/William H. Press. Cambridge University Press (chapters 1-2, pages 1-99); and
- Linear Predictive Spectral Shaping for Acoustical Echo Cancellation. Sanro Zlobec. Department of Electrical Engineering, McGill University, Montreal, November 1995.

It is also the Applicant's understanding that the remaining seven (7) U.S. Patent Documents listed in the Information Disclosure Statement filed August 8, 2001 were part of the Examiner's records and were considered.

In response, the Applicant is filing concurrently herewith an additional Information Disclosure Statement containing copies of the above-listed three (3) non-patent literature documents. The Applicant respectfully requests that the Examiner consider these three (3) documents.

B. Summary of the Amendments

The application now contains 22 claims.
Claims 1-21 are unchanged. Claim 22 is new.

The Abstract of the application has been modified in order to address an objection raised by the Examiner in the Office Action.

The Specification has been amended in order to address a minor informality detected by the Applicant.

No new matter is being added by the present amendments.

C. Statements of Objection and Reply

In the Office Action, the Examiner has objected to the Abstract of the application because it exceeds 150 words in length. In response, the Applicant has modified the Abstract such that it is now less than 150 words in length. The Applicant respectfully submits that the Abstract is now in full compliance with 37 C.F.R. 1.72 and MPEP §608.01(b).

D. Statements of Rejection and Reply

In the Office Action, the Examiner has rejected claims 1-3, 7-9, 13-15 and 19-21 under 35 U.S.C. §103(a) as being obvious over U. S. Patent No. 6,768,796 (hereafter referred to as Lu) in view of European Patent No 0 872 962 A2 (hereafter referred to as Makinen et al.). The Applicant respectfully disagrees with the Examiner's rejection on the basis that the Examiner has failed to establish a *prima facie* case of obviousness.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

With respect to claims 1-3, 7-9, 13-15 and 19-21 Applicant respectfully disagrees with the Examiner's rejection on the basis that the Examiner has failed to establish a *prima facie* case of obviousness on the basis that 1) the prior art reference (or references when combined) do not teach or suggest all the claim limitations and 2) there is no suggestion or motivation to modify the reference or to combine reference teachings.

Firstly, the Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness on the basis that the prior art references do not teach, nor suggest, all of the claim limitations.

Claim 1 reads as follows:

1. *A filter adaptation unit suitable for producing a set of filter coefficients, said filter adaptation unit comprising:*
   a) *a first input for receiving a sequence of samples of a first signal;*
   b) *a second input for receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;*
   c) *a third input for receiving a first set of error characterization data elements associated to a first set of filter coefficients, the first set of filter coefficients being such that when the first set of filter coefficients is applied by an adaptive filter on the first signal, a first estimate of the certain component in the second signal is generated, the certain component being correlated to the first signal;*
   d) *a coefficient generation unit operatively coupled to said first input and said second input, said coefficient generation unit being operative to generate a second set of filter coefficients at least in part on the basis of said first and second signals;*
   e) *an error characterization unit operative for processing the first signal and the second signal on the basis of the second set of filter coefficients to generate a second set of error characterization data elements associated to the second set of filter coefficients;*

f) a selection unit for selecting one of said first set of filter coefficients and said second set of filter coefficients at least in part on the basis of the first set of error characterization data elements and the second set of error characterization data elements;

g) an output for releasing a signal indicative of the set of filter coefficients selected by the selection unit.

The Applicant submits that at least one limitation in neither taught nor suggested by the cited documents.

Firstly on page 3 of the Office Action, the Examiner has relied on signal x(n) twice for disclosing "a first input for receiving a sequence of samples of a first signal" and "a second input for receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal". The Applicant respectfully submits that the incoming far end speech signal x(n) provided to adaptive filter 408 and echo channel 402 cannot possibly be relied upon to teach samples of a first signal and samples of a second signal, as suggested by the Examiner. The second signal may have mistakenly been labeled as x(n) instead of r(n) by the Examiner.

In addition, even if x(n) could somehow be considered a first signal and a second signal, which the applicant maintains is improper, it is unclear what the Examiner considers as the first and second inputs in Lu. A potential source of confusion in Lu is block 402 labeled "ECHO CHANNEL" in figure 7. Echo channel 402 is not an actual component of a filter adaptation unit but rather a representation of the echo phenomenon in general. In other words, blocks 402 and 202 (shown in figure 2) are merely there to illustrate the echo but are not actual components of an adaptation device. The applicant would like to direct the Examiner's attention to column 1, lines 46-53, which describes what the echo channel is:

> "The echo path or channel is the entire path traveled by the transmitted far end signal as it leaves the echo canceller, as a portion of it echoes off of the near end hybrid, and as its echo returns back to the echo canceller. In particular, the echo path represents the outgoing and incoming digital transmission lines as well as the near end network hybrid (the one closest to the near end speaker, and distant from the far end speaker)."

The applicant would also like to direct the Examiner's attention to column 5 lines 26-28 which reads:

> "The unknown Echo Channel 202 is not an actual functional block; rather it is a model of the echo phenomenon."

Echo channel 402 is not a component of a filter adaptation unit since it is not a component at all. Therefore, the input to echo channel 402 referred to by the Examiner as receiving signal x(n) is not a second input to a filter adaptation unit.

Secondly, the Applicant submits that Lu fails to disclose:

> ***"a third input for receiving a first set of error characterization data elements associated to a first set of filter coefficients, the first set of filter coefficients being such that when the first set of filter coefficients is applied by an adaptive filter on the first signal, a first estimate of the certain component in the second signal is generated, the certain component being correlated to the first signal;"***

and

> *"a selection unit for selecting one of said first set of filter coefficients and said second set of filter coefficients* ***at least in part on the basis of the first set of error characterization data elements*** *and the second set of error characterization data elements;"*

In the office action, the examiner indicated that signal e(n) was the third input. The Applicant respectfully disagrees. The signal e(n) in Lu is not used to effect a selection between two sets of filter coefficients.

Thirdly, the Applicant submits that Lu fails to disclose:

> ***"a coefficient generation unit operatively coupled to said first input and said second input, said coefficient generation unit being operative to generate a second set of filter coefficients at least in part on the basis of said first and second signals;"***

The Examiner has further relied on coefficient vector generator/shifter 460 to teach a coefficient generation unit being operative to generate a second set of filter coefficients. The coefficient vector generator/shifter 460 does generate a set of coefficients. However, the Applicant respectfully submits that Lu is completely silent on the generation of a

second set of filter coefficients. Lu merely has a single set of filter coefficients at any given time. The second set of filter coefficients is completely absent.

Fourthly, the Applicant submits that Lu fails to disclose:

> ***"an error characterization unit operative for processing the first signal and the second signal on the basis of the second set of filter coefficients to generate a second set of error characterization data elements associated to the second set of filter coefficients;"***

The Examiner has relied on the "filter part in Figure 8 [of Lu] to generate a second set of error coefficients based on the coefficient generator" for disclosing an error characterization unit operative for processing the first signal and the second signal on the basis of the second set of filter coefficients to generate a second set of error characterization data elements associated to the second set of filter coefficients. The Applicant respectfully disagrees. There is nothing in Lu that generates error characterization data elements. The filter portion of Lu merely applies the filter defined by the coefficients generated by shifter 460 to the signal x(n). Nowhere is there a set of error characterization data elements being generated. Moreover, since Lu merely has a single set of filter coefficients at any given time, there is no second set of filter coefficients and no second set of error characterization data elements.

Further, the Applicant submits that Lu fails to disclose:

> ***"a selection unit for selecting one of said first set of filter coefficients and said second set of filter coefficients at least in part on the basis of the first set of error characterization data elements and the second set of error characterization data elements;"***

On page 4 of the Office Action, the Examiner has accepted that Lu fails to disclose this limitation.

The Examiner has then relied on Makinen et al. for disclosure of a selection unit for selecting one of a first set of filter coefficients and a second set of filter coefficients at least part on the basis of the first set of error characterization data elements and the

second set of error characterization data elements. The Applicant respectfully submits that since Lu fails teach a first set of filter coefficients, a second set of filter coefficients and first and second sets of error characterization elements, that it is unclear how Makinen et al. can be used in combination with Lu.

Given that the combination of Lu in view of Makinen et al. fails to teach all the limitations of independent claim 1, the Examiner is respectfully requested to withdraw the rejection of claim 1 under 35 U.S.C. 103(a) on the grounds that the combination of these references fails to establish a *prima facie* case of obviousness.

In addition, the Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness on the basis that there is no motivation or suggestion found in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to combine the "selection unit" of Makinen et al. with the adaptive filter of Lu.

The Examiner's attention is directed to the case of *In re Oetiker*[1] which states that in order to combine references "there must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of that invention would make the combination. That knowledge can not come from the Applicant's invention itself"[emphasis added]. In the Office Action, the Examiner states the following:

> "it would have been obvious to a person having ordinary skill in the art at the time the invention is made to add a selection unit for selecting one of first set of filter coefficients and second set of filter coefficients at least part on the basis of the first set of error characterization data elements and the second set of error characterization data elements as seen in Makinen et al.' Figure 4 into Lu's invention because it would enable to optimize the

[1] *In re Oetiker* 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed Cir. 1992)

system performance by selecting a right set of error which model the physical environment"

The Applicant respectfully submits that the Examiner has not presented any teachings in any of the references cited by the Examiner that would lead one of ordinary skill in the art to combine Makinen et al. and Lu. There is nothing in the art which suggests selecting one of first set of filter coefficients and second set of filter coefficients on the basis of a first set of error characterization data elements and a second set of error characterization data elements. As indicated above, Lu has a single set of filter coefficients at any given time and therefore there can be no selection between two sets of filter coefficients and therefore there is no motivation to look to Makinen. The Examiner is requested to indicate where in the art, other that the Applicant's application, he has found motivation. The Applicant respectfully submits that since no motivation to combine the reference found in the references has been identified, the Applicant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness.

Claims 2 and 3

Claim 2 reads as follows:

2. *A filter adaptation unit as defined in claim 1, wherein each error characterization data element in the second set of error characterization data elements is associated to a respective frequency band selected from a set of frequency bands.*

The Applicant respectfully submits that the subject matter of claim 2 is not taught by the cited documents. More specifically, the Examiner has relied upon the position controller 470, level comparator 480 and level detector 490 of Lu to argue that Lu teaches that each error characterization data element in the second set of error characterization data elements being associated to a respective frequency band selected from a set of frequency bands. The Applicant respectfully disagrees with the Examiner's interpretation. Position controller 470, level comparator 480 and level detector 490 are each responsible for

"detecting a position of the maximum absolute coefficient in the first sub-window [of the adaptive filter]" (col. 9, lines 28-29, emphasis added), "[comparing] the maximum absolute coefficient value ... with a predetermined threshold value" (col. 9, lines 40-41, emphasis added), and "determining a maximum coefficient in a first sub-window" (col. 9, lines 9-10, emphasis added), respectively. All these steps are done on signal e(n) and performed in the time domain. Signal e(n) in Lu is the residual of the filtering process. This is a time-domain signal that has one element per time sample and changes constantly depending on q(n) and r(n). As such e(n) simply represents the instantaneous amplitude of the sum of the filtering error plus the local signal contained in r(n) (see Lu, FIG 8). The sub-windows in Lu are not frequency bands but rather refer to time segments of a signal in the time domain. Nothing in Lu, nor in the other cited documents, teaches or suggests error characterization data elements associated to a respective frequency band selected from a set of frequency bands.

Consequently, the applicant respectfully requests that the Examiner withdraw his rejection of claim 2.

Claim 3 reads as follows:

3. *A filter adaptation unit as defined in claim 2, wherein said error characterization unit is operative for:*
a) *filtering the first signal on the basis of the second set of filter coefficients to derive a second estimate of the certain component in the second signal, the certain component being correlated to the first signal;*
b) *removing from the second signal the second estimate of the certain component to generate a noise signal;*
c) *processing the noise signal and the first signal to generate the second set of error characterization data elements.*

With respect to claim 3, the Examiner has indicated that the echo channel 402 of Lu is operative for filtering the first signal on the basis of the second set of filter coefficients to derive a second estimate of the certain component in the second signal. As stated at column 8, lines 26-29, "a far end speech x(n) passes through an unknown echo channel

402, thus, creating a far end echo signal y(n) that is combined with a near end speech signal v(n) at summer 404 to form a signal r(n)". The applicant respectfully disagrees with the Examiner's interpretation. As indicated above, unknown echo channel 402 illustrated in Figure 7, being equivalent to unknown echo channel 202 illustrated in Figure 2, "is not an actual functional block, rather it is a model of the echo phenomenon" (col. 5, lines 26-28, emphasis added). As such, echo channel 402 is not part of a filter adaptation unit and is merely a model of the echo channel. Therefore echo channel 402 is not operative to filter the first signal or derive a second estimate of a certain component in the second signal.

Given that the combination of Lu in view of Makinen et al. fails to teach all the limitations of dependent claims 2 and 3, the Examiner is respectfully requested to withdraw the rejection of claims 2 and 3 under 35 U.S.C. 103(a) on the grounds that the combination of these references fails to establish a *prima facie* case of obviousness.

Claims 7, 13, 19 and 21

Independent claims 7, 13, 19 and 21 contain limitations similar to those of independent claim 1, which were already shown to be neither taught nor suggested by Lu or Makinen et al. Thus, for the same reasons set forth hereinabove in support of independent claim 1, the Applicant respectfully submits that independent claims 7, 13, 19 and 21 are in allowable form and, as such, the Examiner is respectfully requested to withdraw the rejection of independent claims 7, 13, 19 and 21 under 35 U.S.C. 103(a) on the grounds that the combination of these references fails to establish a *prima facie* case of obviousness.

Claims 8, 9, 14, and 15

Claims 8, 9, 14, and 15 contain limitations similar to those of claims 2 and 3, which were already shown to be neither taught nor suggested by Lu and Makinen et al. Thus, for the

same reasons set forth herein above in support of claims 2 and 3, the Applicant respectfully submits that claims 8, 9, 14, and 15 are in allowable form and, as such, the Examiner is respectfully requested to withdraw the rejection of independent claims 8, 9, 14, and 15 under 35 U.S.C. 103(a) on the grounds that the combination of these references fails to establish a *prima facie* case of obviousness.

Claim 20

Claim 20 depends from claim 19 and therefore includes all the limitations of independent claim 19. As such, claim 20 is also believed to be in allowable form and the Applicant respectfully requests that the Examiner withdraw the rejection of claim 20 under 35 U.S.C. 103(a) on the grounds that the combination of these references fails to establish a *prima facie* case of obviousness.

In summary, since the Examiner has failed to establish a *prima facie* case of obviousness on the basis that a) it has not been shown that there is motivation or suggestion found in the references themselves, or in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings, and b) the prior art references do not teach, nor suggest, all of the claim limitations, the Applicant respectfully submits that claims 1-3, 7-9, 13-15 and 19-21 are in full compliance 35 U.S.C. 103(a).

E. New Claim 22

Claim 22 reads as follows:

22. (New) A filter adaptation unit suitable for producing a set of filter coefficients, said filter adaptation unit comprising:
- *a) a first input for receiving a sequence of samples of a first signal;*
- *b) a second input for receiving a sequence of samples of a second signal, the second signal including a certain component which is correlated to the first signal;*
- *c) a third input for receiving a first set of error characterization data elements associated to a first set of filter coefficients, the first set of filter coefficients being such that when the first set of filter coefficients is applied by an adaptive filter on the first signal, a first estimate of the certain component in the second signal is*

generated, the certain component being correlated to the first signal, ***the first set of error characterization data elements including at least one element associated to a frequency band;***

d) a coefficient generation unit operatively coupled to said first input and said second input, said coefficient generation unit being operative to generate a second set of filter coefficients at least in part on the basis of said first and second signals;

e) an error characterization unit operative for processing the first signal and the second signal on the basis of the second set of filter coefficients to generate a second set of error characterization data elements associated to the second set of filter coefficients, ***the second set of error characterization data elements including at least one element associated to a frequency band;***

f) a selection unit for selecting one of said first set of filter coefficients and said second set of filter coefficients at least in part on the basis of the first set of error characterization data elements and the second set of error characterization data elements;

g) an output for releasing a signal indicative of the set of filter coefficients selected by the selection unit.

New independent claim 22 contains limitations similar to those of independent claim 1, which were already shown to be neither taught nor suggested by Lu or Makinen et al. Furthermore, new claim 22 includes the limitations:

> *"the first set of error characterization data elements including at least one element associated to a frequency band"*

and

> *"the second set of error characterization data elements including at least one element associated to a frequency band".*

The Applicant respectfully submits that these limitations are neither taught nor suggested by the prior art cited. In Lu, all processing is done in the time domain. The sub-windows in Lu are not frequency bands but rather refer to time segments of a signal in the time domain. Nothing in Lu, nor in the other cited documents, teaches or suggests an error characterization data element associated to a frequency band.

Consequently, the applicant submits that the subject matter of claim 22 is neither taught nor suggested by the cited documents.

CONCLUSION

It is respectfully submitted that claims 1-22 are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance of claims 1-22 at an early date is solicited.

If the claims of the application are not considered to be in full condition for allowance, for any reason, the Applicant respectfully requests the constructive assistance and suggestions of the Examiner in drafting one or more acceptable claims or in making constructive suggestions so that the application can be placed in allowable condition as soon as possible and without the need for further proceedings.

Respectfully submitted,
Awad et al., Applicant

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